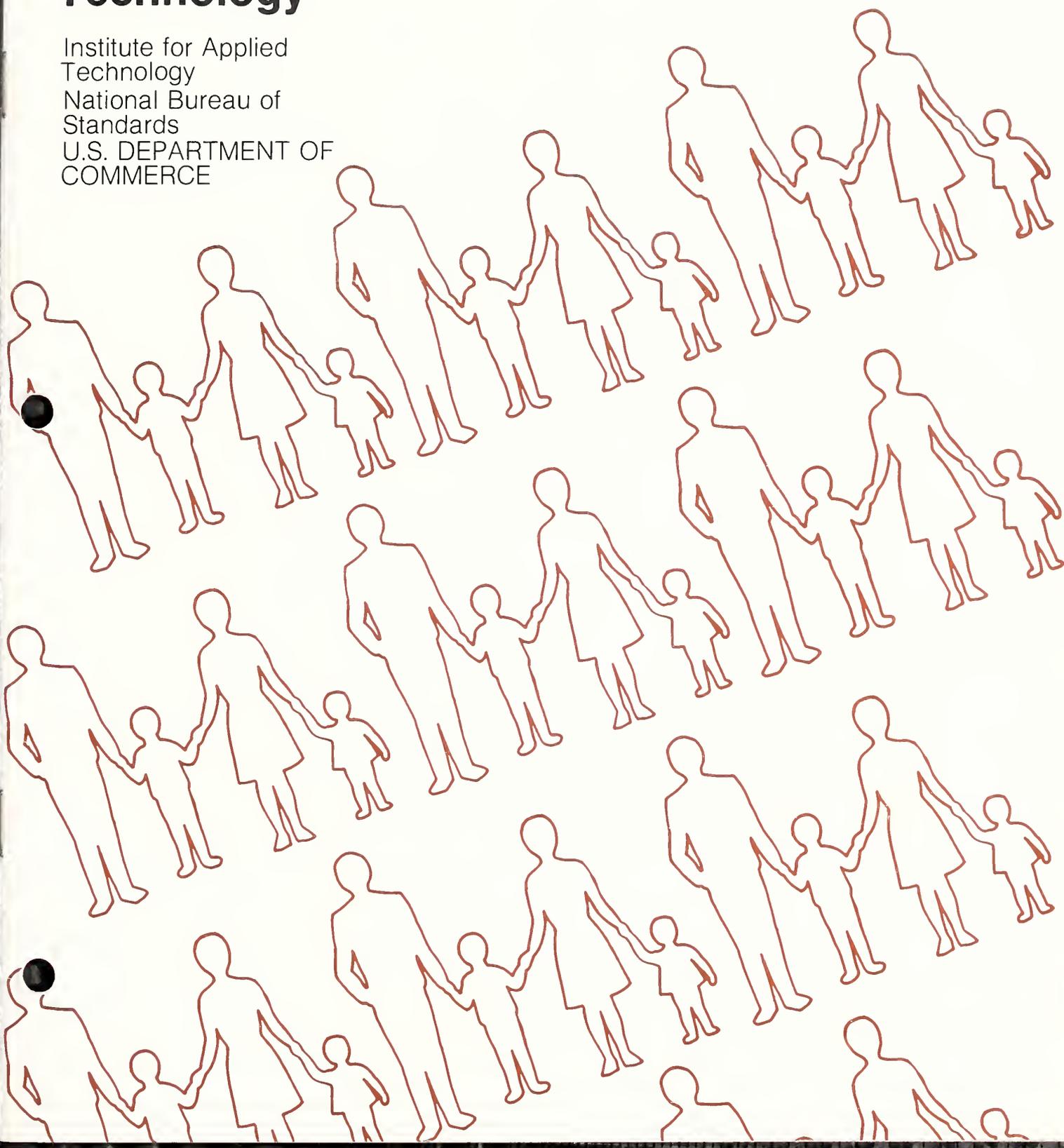
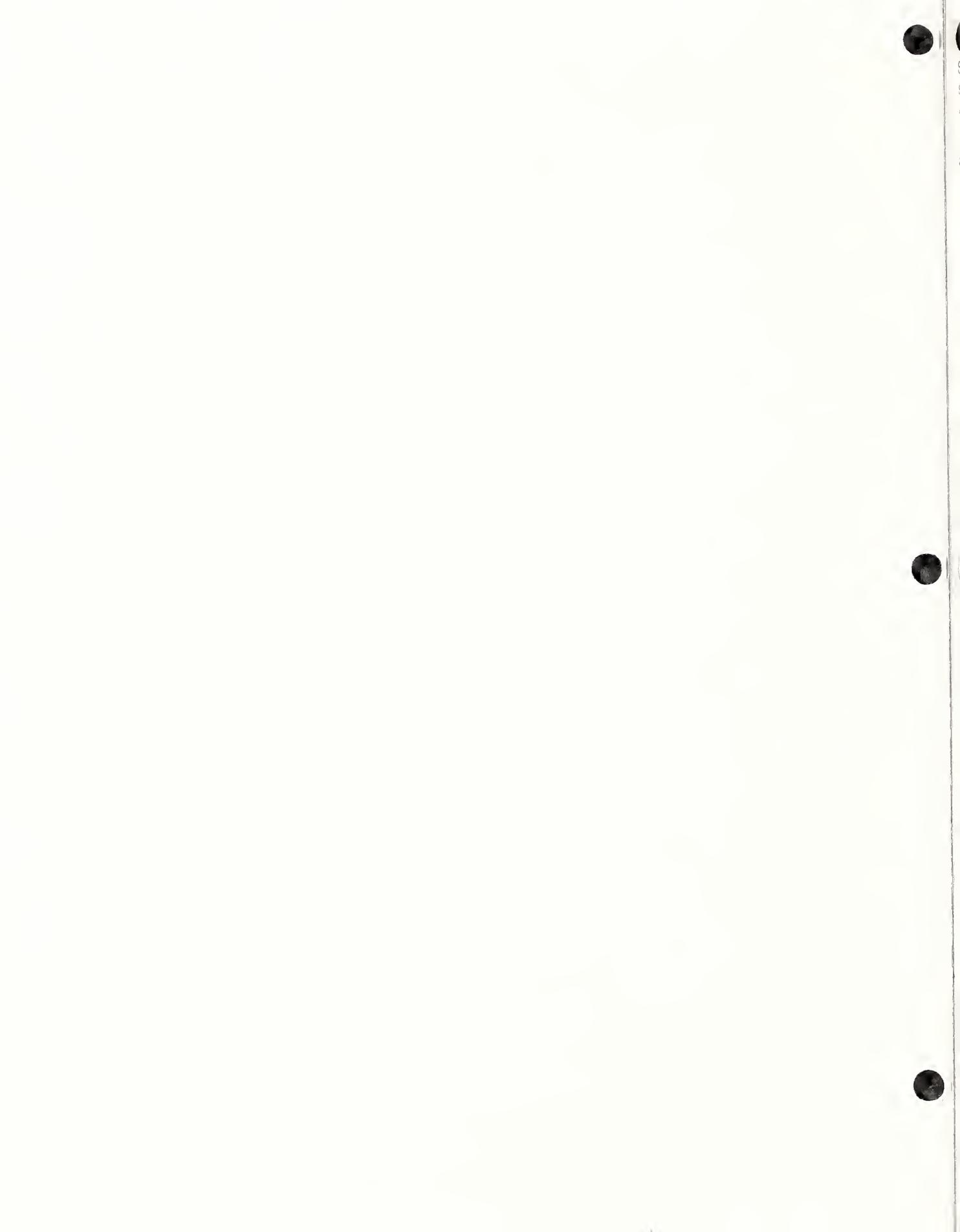


The Center for Consumer Product Technology

Measurement
Technology
for the
Marketplace

Institute for Applied
Technology
National Bureau of
Standards
U.S. DEPARTMENT OF
COMMERCE





THE CENTER FOR CONSUMER PRODUCT TECHNOLOGY (CCPT) of the NATIONAL BUREAU OF STANDARDS (NBS) provides a single focal point for all NBS programs concerned with consumer product performance and product safety.

For 75 years NBS has been the authoritative source of physical measurements and measurement methods for the United States. The Bureau's programs have ranged from fundamental research on ways to devise better tools of measurement to more applied research on problems of immediate nationwide concern where measurement and measurement methods are central to practical solutions.

The CCPT takes advantage of the advanced scientific and technical capability and facilities of the NBS as it seeks solutions to the problems of improving the utility and safety of consumer products, of finding ways to make more efficient use of energy, and of facilitating the development of an informed, equitable consumer product marketplace.

The rapid rate of technological advancement in the United States has had a tremendous impact on society. It has increased both the numbers and kinds of consumer products on the market and their complexity. The product proliferation is clearly visible in the numerous products found in and around the home. Furthermore, each item usually comes in several different sizes or models. A few of the most common are: refrigerators, stoves, washers, and televisions.

Whether the choice is based on the economic value of a product or the desire for optional features, the consumer is faced with the difficult task of making reasonable price and quality comparisons. This difficulty is most severe for products that are expected to last a long time (for example, a refrigerator), where the technology is changing rapidly (solid state television or hand held calculators) and those performance

characteristics that are not readily apparent to the layman. The individual consumer must have access to pertinent information in order to identify the best alternatives for his personal needs.

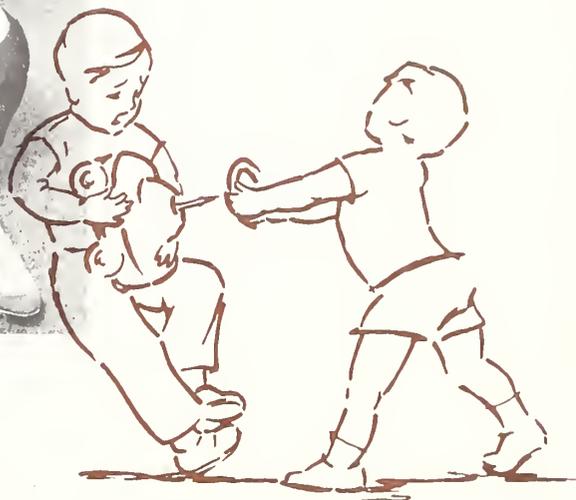
OBJECTIVES

To provide both the producing and consuming population with fair and consistent information, the Center works toward the following objectives:

- Developing test methods that measure the energy consumption efficiency of household appliances.
- Developing national performance standards for equipment and products commonly used by consumers and state and local law enforcement agencies.

- Identifying the safety requirements of consumer products and developing improved measurement techniques, test methods, and criteria for measuring product safety.
- Developing and disseminating product information to consumers.

These objectives benefit both the consumer and industry. Accurate and uniform product performance information assists the consumer in evaluating products and estimating the cost effectiveness of purchases. Industry is aided through equitable standards and appropriate measurement technology for evaluating their products.



STAFF

Solutions to the problems which arise between the public and the products it consumes typically require a wide range of multidisciplinary activities. In the Center, engineers, physicists, chemists, operations research analysts, behavioral scientists, and other specialists work together to develop measurement and test methods for evaluating consumer products. The engineers, for example, are concerned primarily with design--does it do what it is supposed to do, are there design changes that will improve the efficiency, durability, and safety. Behavioral scientists, on the other hand, are concerned with understanding the behavior, perceptions, physical abilities of product users, and methods of applying such knowledge to product design, performance, and information standards. These standards may involve the performance, safety or economic characteristics of consumer products.

CONSUMER INPUT

In carrying out the foregoing activities, CCPT utilizes a variety of means to obtain consumer views. Consumer Sounding Boards are one method. These boards are composed of a demographic cross section of consumers convened for the purpose of providing standards-making organizations with direct consumer involvement in their programs. The Center also surveys consumers to determine their information needs and product use patterns. The unique needs and problems of the law enforcement community are identified through quarterly meetings with an advisory committee of the International Association of Chiefs of Police.

INFORMATION DISSEMINATION

Results of NBS-developed technology of interest to consumers are presented to the public in a comprehensive and convenient form. CCPT publishes the Consumer Information Series and other pamphlets and reports, which describe the results of NBS research and its application in the consumer interest. Current consumer information publications deal with such topics as energy conservation in the home, the metric system of measurement, and door security. Similarly, the CCPT staff has developed a series of guideline documents that are distributed by the National Criminal Justice Reference Service. Some, such as the guideline for hearing protectors for firing ranges, are of interest to both law enforcement personnel and the sportsman, while others, such as the guideline to the selection and application of fixed surveillance cameras, are directed toward the small businessman. A complete listing of CCPT publications is available in a document entitled *Center for Consumer Product Technology Publications, November 1975 to April 1976*.

Programs

Technical activities are in the following program areas.

- Product Performance
- Product Energy Conservation
- Product Safety
- Product Standards

These programs are described briefly on the following pages.

PRODUCT PERFORMANCE

This program is directed toward solving technical problems associated with developing test methods for measuring consumer product performance and with translating and presenting the resulting information to the consumer in a useable form.

Combining several disciplines and research techniques, this program:

- Develops and evaluates uniform test methods for measuring the performance characteristics of consumer products.
- Identifies consumer product needs through studies of the behavior, perceptions, and physical abilities of product purchasers and users.
- Develops methodologies for applying research results to product design and performance standards.
- Expands the knowledge base in product performance measurement technology.

Door Security

The CCPT effort to develop standards for the physical security of doors is a good example of product performance research. By measuring the forces exerted on door assemblies as a consequence of forcible entry techniques employed by burglars, it was possible to design simple, accurate and reproducible test methods that could be used to evaluate the security of entry doors. The test methods were adopted by ASTM and industry, where previously no performance oriented standard test methods existed.

Life-Cycle Cost

Work is in progress on a project to develop a methodology to calculate the total cost of purchasing and operating various consumer products, i.e., the life-cycle cost (LCC). The LCC of a consumer product is the total cost of the product over its useful life. It includes the purchase price, average annual cost of operation, maintenance requirements, frequency of repair, and other elements that comprise life-cycle costing. The NBS research will: (1) identify and evaluate existing methods for comparing life-cycle costs; (2) identify key parameters that must be measured to establish costs; (3) define

cost and develop standard methods for evaluation of major consumer product purchases; (4) apply standard methods to selected consumer product purchases. One such completed study, "The Police Patrol Car: Economic Efficiency in Acquisition, Operation, and Disposition," provides local jurisdictions with the information required to make the most efficient use of limited resources for the operation of police vehicles; a direct benefit to the consumer.

PRODUCT ENERGY CONSERVATION

The appliance labeling program provides the consumer, at the point of purchase, with a method for determining the energy efficiency of household appliances. While the Federal Energy Administration has the lead agency responsibility, NBS provides technical support primarily in the following areas:

- Efficiency research to estimate the technical feasibility and economic impact of energy improvements.
- The development and refinement of test methods to determine the energy usage and efficiency of household appliances.

Results of this research will provide a test procedure for measuring the energy usage of appliances under standard test conditions in the laboratory and will reflect the energy usage that might be expected under typical use conditions in the home. This research will also provide FEA with information on what efficiency improvements are possible in order for FEA to set meaningful targets for efficiency improvements of the various products.

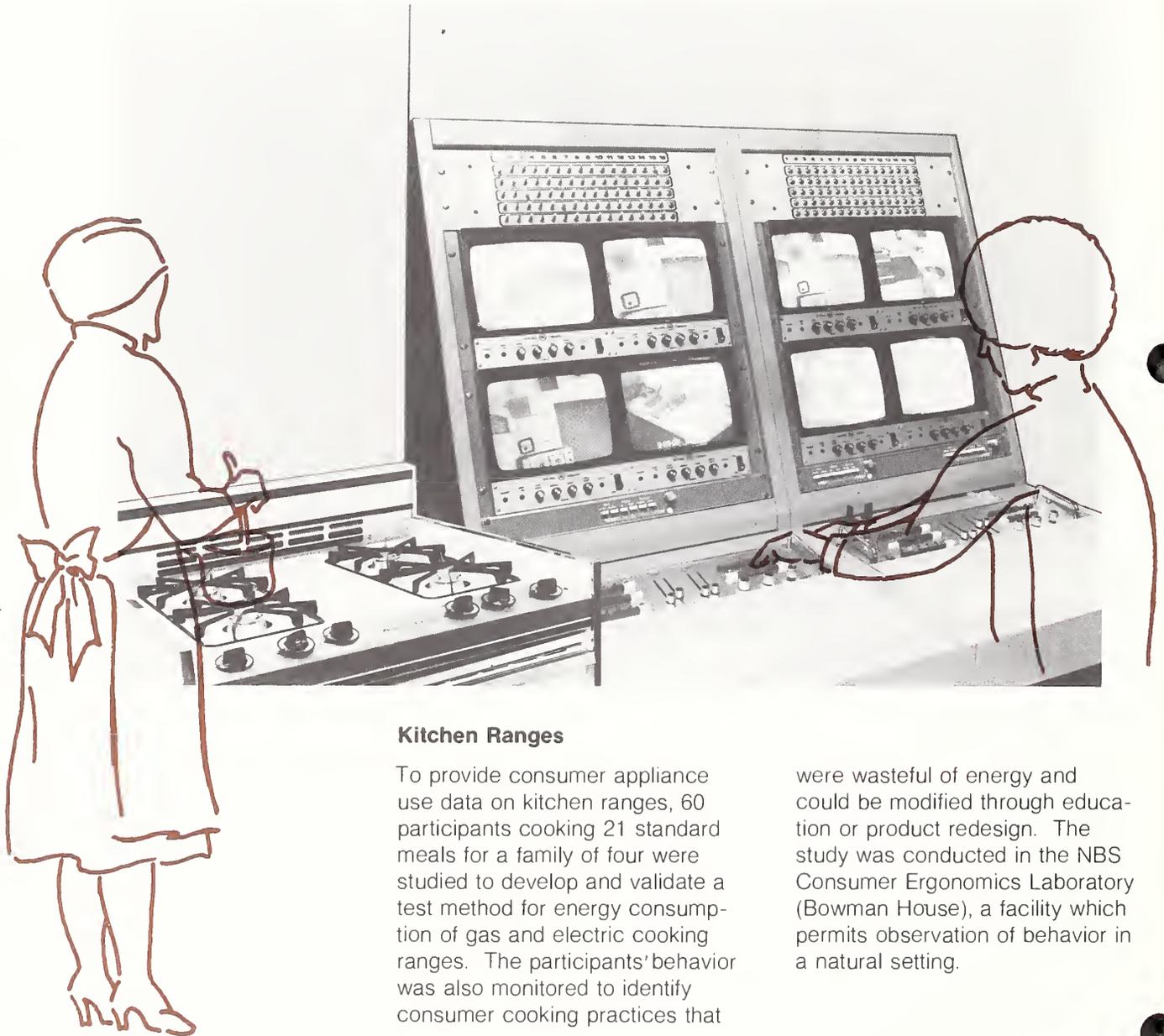


Gas Water Heaters

Energy losses of currently manufactured gas water heaters are significant. This project's objective is to reduce the standby loss and flue loss of these heaters, without adversely affecting safety and reliability. The effect of additional insulation and the reduced input rate of the pilot light is being investigated to define optimum performance with respect to minimal

standby loss and safe and reliable operation in use. Optimum insulation thickness is expected to reduce insulation wall loss by approximately 2/3 that of the current loss. New controls and flue dampers are also being investigated to determine their potential for improvements. Upon completion of this work, the types

of controls needed to improve service efficiency will be identified. If these controls are not currently available, additional research will be proposed to develop them.



Kitchen Ranges

To provide consumer appliance use data on kitchen ranges, 60 participants cooking 21 standard meals for a family of four were studied to develop and validate a test method for energy consumption of gas and electric cooking ranges. The participants' behavior was also monitored to identify consumer cooking practices that

were wasteful of energy and could be modified through education or product redesign. The study was conducted in the NBS Consumer Ergonomics Laboratory (Bowman House), a facility which permits observation of behavior in a natural setting.

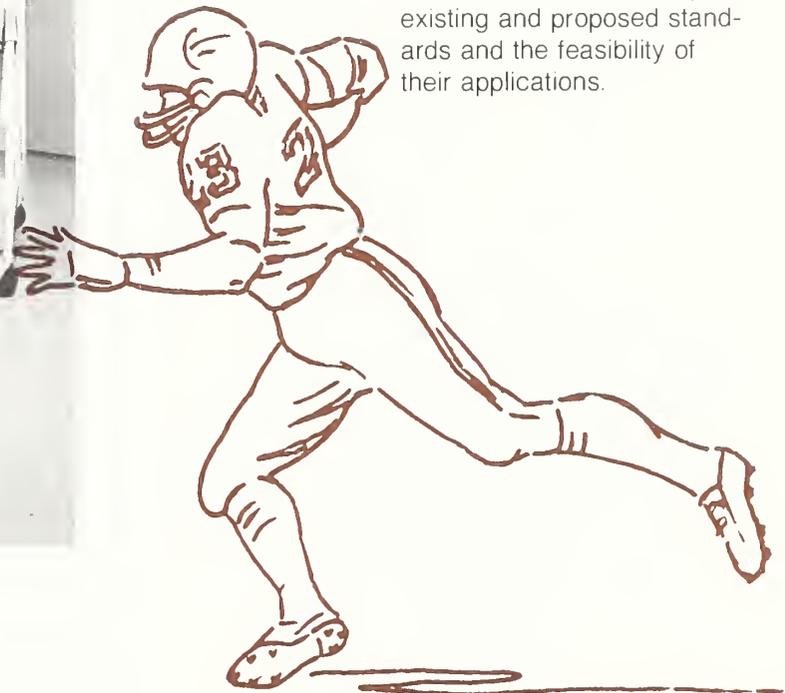
PRODUCT SAFETY

Under the Consumer Product Safety Act (CPSA) Public Law 92-573, the Consumer Product Safety Commission (CPSC) is charged with the responsibility for protecting the public against unreasonable risk of injury associated with consumer products, assisting consumers in evaluating the com-

parative safety of consumer products, and developing uniform safety standards. The Act also directs CPSC to use to the maximum extent practicable the resources and facilities of the National Bureau of Standards in the execution of these responsibilities.

The NBS technical activities in product safety include:

- Laboratory testing of products suspected of having substantial design hazards to assist CPSC in selecting appropriate corrective actions.
- Long range research in the areas of hazard strategy analysis, human factors, consumer behavior, and test methodologies.
- Development of instrumentation and test methods or procedures to describe performance levels.
- Participation in the development of safety standards by assisting in the establishment of criteria and tests, selection of organizations to develop standards, monitoring the development process, and providing technical evaluation of proposed draft standards.
- Assessment of the validity of existing and proposed standards and the feasibility of their applications.



Sharp Points

Sharp points, capable of producing injury, are frequently found on consumer products. Of particular concern is the presence of sharp points on toys, which may be the result of poor design, poor quality control, or damage to the toy due to use by children at play.

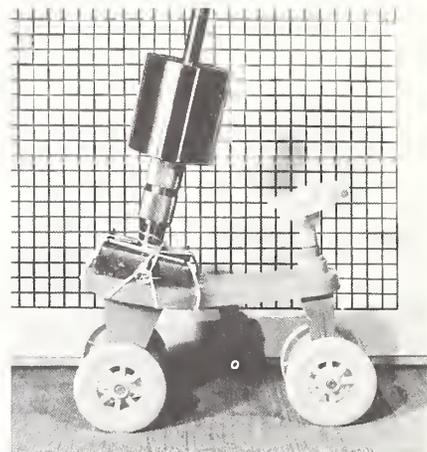
CCPT engineers developed a method for evaluating and testing the sharpness of points. After defining hazardous sharp points, an instrument was developed which differentiates hazardous sharp points from nonhazardous points.



Riding Toys

Each year hundreds of children are injured as a result of falling from poorly balanced riding toys or being exposed to toys that have structural design deficiencies. In attempting to deal with this problem, CCPT conducted stability and abuse tests on ride-on or ride-in toys, other than tricycles and scooters, designed for use by children 8 years old or less.

The data obtained from these tests can be used in formulating criteria for establishing test methods and performance standards for riding toys. These data can also be of value in identifying potential hazards associated with riding toys.



PRODUCT STANDARDS

The development of product standards involves two distinct approaches: the generic and the product specific, where each method takes advantage of the inherent characteristics of the problem being addressed. The development of test instrumentation is a necessary part of the standards process.

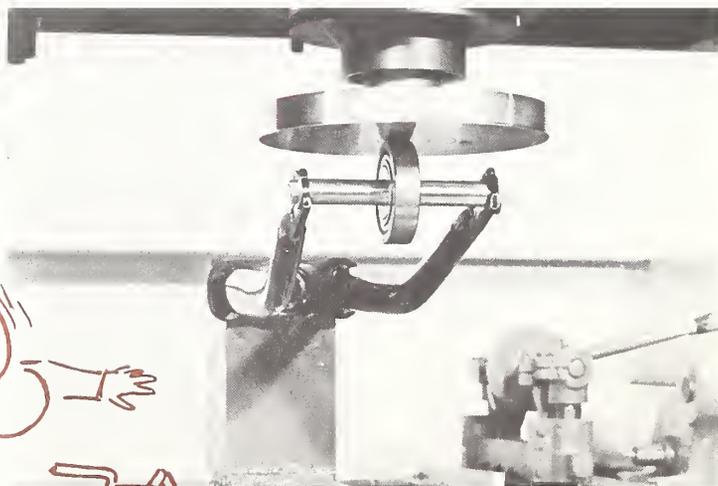
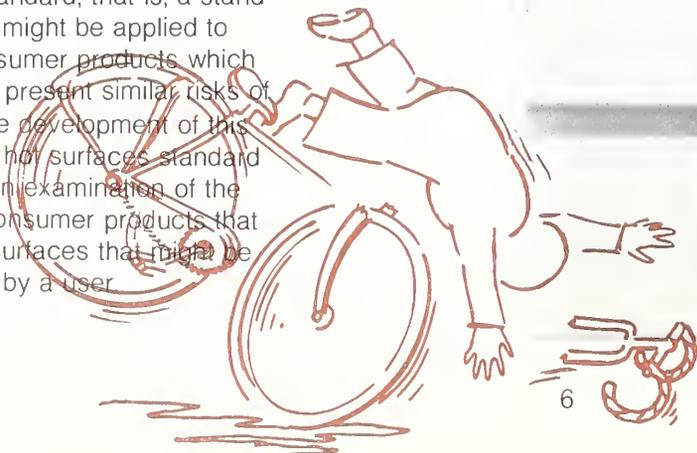
Product Specific Standards

The National Bureau of Standards also worked closely with the Consumer Product Safety Commission in the development of a set of regulations for bicycles under the Federal Hazardous Substances Act. In the recent past bicycles were associated with more product-related injuries than any other consumer product, in particular, those involving children. NBS

helped to develop instrumentation and test procedures to be used by manufacturers and the regulatory authorities to insure that bicycles comply with the new regulations. It is anticipated that these regulations will contribute to a significant reduction in the accident rate. This effort represents a standard that is product specific.

Generic Standards

CCPT recently completed a study of the factors that must be considered for the development of a generic standard, that is, a standard which might be applied to many consumer products which potentially present similar risks of injury. The development of this illustrative hot surfaces standard included an examination of the kinds of consumer products that have hot surfaces that might be contacted by a user.



Test Instrumentation

To evaluate the safety of consumer products that involve the generation of heat, NBS engineers developed an instrument which can duplicate human skin contact temperature with a heated surface. Surface temperature measurement alone is insufficient to establish the hazard. A metal surface, for instance, is more likely to cause thermal injury than a plastic surface at the same temperature.

This instrument, known as a "thermesthesiometer," is capable of qualitatively establishing the thermal hazard associated with any surface by simulating the human response to contact with a surface. The advantage of the new instrument is that a thermal

safety standard can be written around one specific contact temperature for nearly any material regardless of its composition or surface temperature. Knowing that the product is potentially unsafe, the risk to the consumer can be reduced by appropriate use of nonconducting materials or by restricting the access to hot surfaces.



Law Enforcement Equipment

The CCPT efforts in support of the Law Enforcement Assistance Administration (LEAA) are similar in nature to the CPSC support. Body armor and protective headgear such as riot helmets are essential to the safety of police officers. The development of standards for such equipment requires the development of safety technology that can readily be adapted to a broad range of consumer products, including protective equipment for use in sports.

Technical Activities:

- The laboratory testing and evaluation of the performance of law enforcement equipment.

- The development of methods for measuring the performance of this equipment.
- The preparation of performance standards and a variety of reports on the equipment.
- The development of standard reference materials and special devices.

The performance standards that the CCPT develops for law enforcement equipment are also of direct benefit to the consumer. Standards for communication equipment, for example, serve to increase the efficiency of the police, and enable faster response to emergency situations. Similarly, standards for such equipment as metal weapons detectors screen passengers to

help insure that the plane you take will not be hijacked. Collection of reference materials such as automobile paint and headlight glass aid in the identification of hit and run vehicles.

Burglar Alarm Standards

As an outgrowth of police department problems with the high false alarm rate of present burglar alarm systems, CCPT is developing standards for burglar alarm components. Equipment meeting the NBS standards, which are published by the Law Enforcement Assistance Administration, is reliable and is subject to fewer false alarms than many of the commercially available units.

FACILITIES

CCPT maintains in-house facilities to support activities for product standards development. These facilities range from specialized laboratories for testing kitchen appliances to a ranch-styled home (Bowman House) furnished and equipped for the study of consumer-product interactions.

In addition, as a unit within NBS, the Center has access to a wide variety of unique equipment. Included in the Bureau's inventory is a high flux nuclear reactor, an anechoic chamber, nondestructive test facilities, a visual performance range, and fire research laboratories.

SUPPORT SERVICES TO OTHER AGENCIES

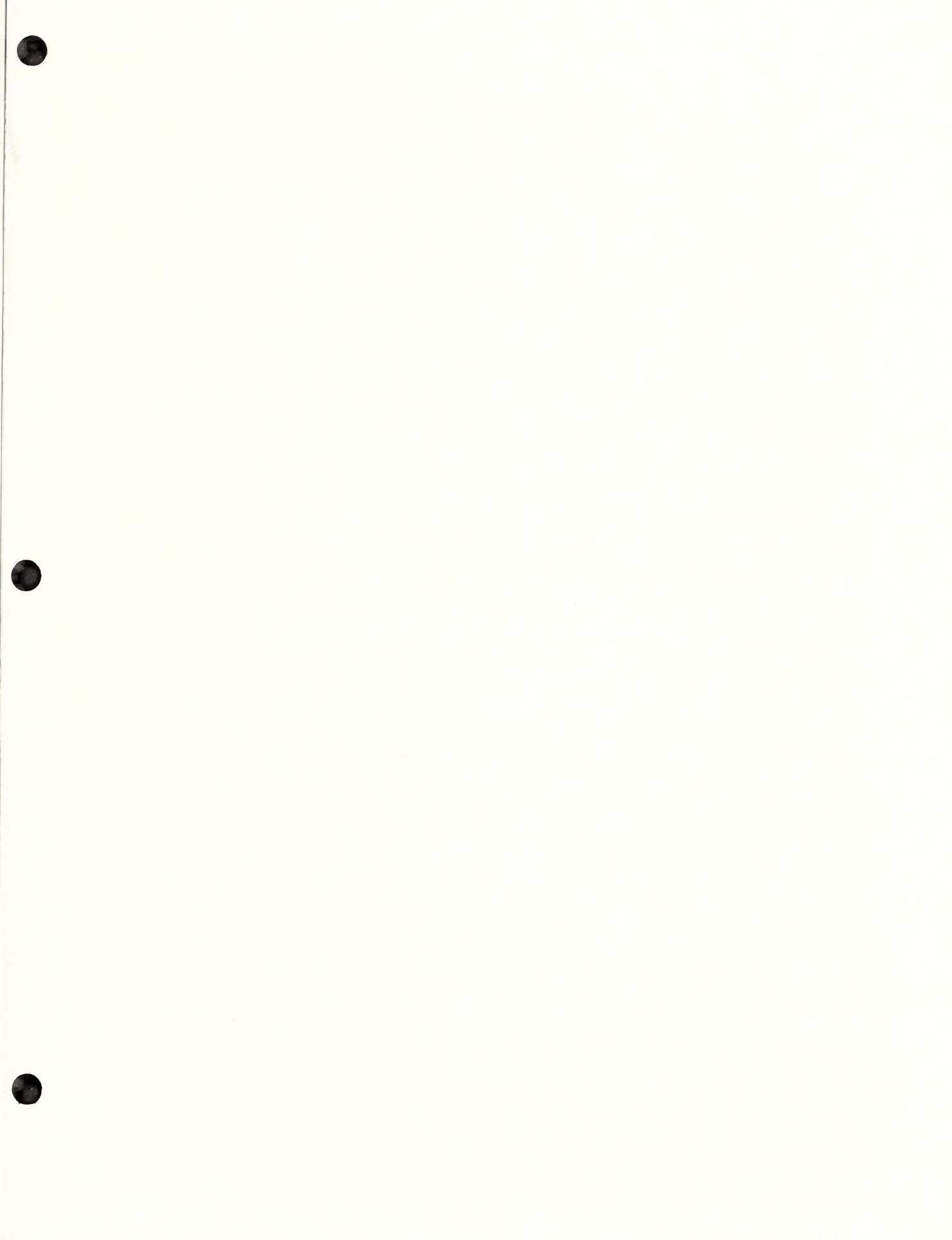
The Center provides technical support on a reimbursable basis to other Federal agencies. Services to these agencies are authorized or mandated by specific legislation and are an integral part of CCPT program planning. Federal agencies that are using or have used the Center's facilities include:

- Consumer Product Safety Commission
- Law Enforcement Assistance Administration
- National Highway and Traffic Safety Administration
- Federal Energy Administration
- Federal Trade Commission
- Occupational Safety and Health Administration
- Office of Consumer Affairs
- General Services Administration

INFORMATION

For further information on CCPT programs call: (301) 921-3751 or write to:

National Bureau of Standards
Center for Consumer Product
Technology
Building 224, Room A-355
Washington, D. C. 20234





75 YEARS
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